

## Molecular regulation of stem cell potency

### Grant Award Details

Molecular regulation of stem cell potency

**Grant Type:** Basic Biology V

**Grant Number:** RB5-07422

**Project Objective:** To assess potency of MuSC populations, to explore the molecular characterization of the highly potent stem cell state at transcriptional and epigenetic levels, and to examine the molecular regulation that determines that potency.

**Investigator:**

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|---------------------|---|
| <b>Name:</b>        | Thomas Rando                              |
| <b>Institution:</b> | Palo Alto Veterans Institute for Research |
| <b>Type:</b>        | PI  |

**Disease Focus:** Aging, Skeletal/Smooth Muscle disorders, Trauma

**Human Stem Cell Use:** Adult Stem Cell

**Award Value:** \$966,510

**Status:** Closed

### Progress Reports

**Reporting Period:** Year 1

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**Reporting Period:** Year 2

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**Reporting Period:** Year 4 (NCE)

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## Grant Application Details

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**Application Title:** Molecular regulation of stem cell potency

**Public Abstract:** The field of stem cell biology as it applies to regenerative medicine requires a detailed understanding of what controls stem cell function. Our fundamental interest is in the molecular pathways that control how potent a stem is in terms of its ability to make new tissues in response to injury and disease. We have focused on a population of stem cells in skeletal muscle that are responsible for the healing of muscle after injury. These cells normally exist in a dormant state and it is in that state that they are most potent. However, when these cells are stimulated to divide, and especially when the cells are grown in the laboratory, they very quickly lose their potency, as they do gradually during aging. The main focus of our proposal is to understand what controls that potency and to determine if we might be able experimentally to enhance the potency of muscle stem cells. These findings will lead to a more fundamental understanding of stem cell biology and also have the potential to enhance greatly our ability to use these cells for therapeutic purposes such as healing traumatic injuries, treating degenerative diseases such as muscular dystrophies, and slowing age-related muscle loss.

**Statement of Benefit to California:** A major benefit to California of our studies will be to bring hope to patients across the state with diseases and disorders of muscle for which there is no cure and limited treatment options. This would include veterans with traumatic limb injuries associated with substantial muscle loss and thousands of patients with muscular dystrophies. Due to the growing field of regenerative medicine from the investment of the citizens of California in CIRM, this state has become the world leader in the development of stem cell therapeutics. Our research would contribute substantially to this enterprise by increasing our understanding of the control of the potency of stem cells to repair muscle and by developing methods to enhance that potency. Our ongoing studies have revealed ways to increase the potency of muscle stem cells experimentally, and we will directly test these in studies of muscle repair. In addition, we will explore the processes that determine and control muscle stem cell potency, and we will test directly for the actions of specific genes that may be important determinants of stem cell potency. The successful completion of these studies would put California at the forefront of stem cell therapeutics for muscle loss and degenerative muscle diseases.

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